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ABSTRACT

This study determined the effect of written persuasive communication on changing the attitudes of Egyptian preservice biology teachers toward teaching the topic of organic evolution. Attitude change was measured by administering an instrument (the Attitude Toward Teaching Evolution Scale) developed for the study. This 22-item, Likert-type scale (with 11 positive and 11 negative statements related to teaching evolution) was administered as a pretest and posttest to assess attitude change. Subjects, consisting of 154 volunteers (46 males and 108 females), were randomly divided into two equal treatment groups. The experimental group used persuasive communication which consisted of two opposite arguments related to teaching organic evolution. The control group used written communication about air pollution. Results indicate a significant difference in mean posttest scores between the experimental and control group in favor of the experimental group. Thus, it was concluded that the Egyptian preservice biology teachers who had received the written persuasive communication had a positive change in their attitudes toward teaching evolution to secondary school students. (Author/JN)

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The Effect of Written Persuasive Communication On Changing Attitudes of Egyptian Preservice Biology Teachers Toward Teaching Evolution

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ABSTRACT

The purpose of this study was to determine the effect of written persuasive communication on changing attitudes of Egyptian preservice biology teachers toward teaching the topic of organic evolution. The Pretest- Posttest control Group Design was chosen as the design for this study. The subjects who participated in this study consisted of 154 volunteers (46 males and 108 famales) enrolled at Biology Section in the College of Education, University of Tanta ,Egypt during the acadmic year 1983-1984. The subjects were randomly divided into two equal treatment groups: 1) The experimental group(the persuassive communication group); and 2) the control group (the control communication group). Two different treatment materials were used as a part of this investigation: 1) The persuasive communication which consisted of two opposite arguments related to teaching the topic of organic evolution in schools, and 2) the control communication which consisted of a written communication about air pollution . The Attitude Toward Teaching Evolution Scale was developed to be used in this study. This scale was administered as a pretest and posttest to assess attitude change. Analysis of covariance was used to analize the date . The finding of this study indicated that there was a significant difference(at the .05 level) in the adjusted

posttest mean scores between the experimental group and the conrol group . This difference was in favor of the experimental group. It was concluded that Egyptian preservice biology teachers who received the written persuasive communication had a positive change in their attitude toward teaching evolution to secondary school students .

Introduction

The need to change attitudes of science teachers toward teaching the topic of organic evolution, has been established due to these reasons. First, some studies have indicated that science teachers have a negative or neutral attitudes toward teaching this topic. In a recent Egyptian study, Naglla(1982) found that 59 % of science teachers would avoid teaching the topic of organic evolution to secondary school students. The result of the Egyptian study seems to agree in general with the results of similar American investigations(e.g., Eglin & Graham, 1984; Troost, 1966). Second, a review of literature deeling with changing attitudes of science teachers toward teaching the topic of organic evolution reveals a lack of studies in this area. Thirdly, The investigators of the present study conducted interviews with 40 preservice biology teachers, enrolled at two colleges of education in Egypt. These interviews revealed that about 50 % of the interviewees would resist teaching the topic of organic evolution in the future . Finally , the teachers negative attitudes toward that topic could influence their students attitudes toward this topic(Grose & Simpson , 1982) .

Thus it seems reasonable to assume that the need for the science teachers to have more positive attitudes toward teaching the topic of organic evolution .

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The Theoretical Basis of the Study

Several researchers refer to the lack of a theoretical basis in most attitude related studies in science education (Haladyna & Shaughnessy , 1980; Peterson & Carlson , 1979 ; Shrigley , 1976) . In their review of attitude research, Peterson and Carlson (1979) concluded that the findings are chaotic and comfusing. Furthermore , Peterson and Carlson urged science education researchers to determine the elements (i.e., the theoretical basis on which attitude change studies could be designed) that influence change in attitude and develop ways to promote and modify teachers and students attitudes .

Shrigley and his associates (1976) suggested the need to examine the attitude of teachers in the light of the theoretical models generated by social psychologists. Shrigley (1978) cited four viable approaches to attitude modifications :(1) the perceptual, which is considered less well developed;(2) the functional, described within the context of science education by Shrigley (1977) ; (3) cognitive dissonance,

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designed by Festinger (1956) ; and (4) the learning theory , or persuasive communication approach designed by Hovland and his associates (1953). This investigation is concerned with the fourth approach .

The persuasive communication approach , known as the Hovland's persuasive communication model , assume that man is a rational information-processing organism , and that confronting him with a formal communication having the need for an attitude change (the stimulus) should result in learning a new attitude (the response) in much the same way that one learns a cognitive skill .

There are four parts to Hovland's model summarized by the statement " who says what , to whom, with what effect ? " Translating this conceptualization into the area of science education , Shigley (1976) assumed that :

1- The " who" is the science educator, the communicator.

2- The " what " is the formal , persuasive oral ,

3- " Whom" is the recipient of the communication, those preparing to teach science in the elementary school .

4- " What effect " would be the change in behavior, the learned result on the part of the teachers, the response. (P.335) .

Following Shrigley's (1976) conceptualization , Grabowski (1979) , Koballa (1981) , and Hassan (1982) tested the aforementiond components of the model . Using a videotaped message as a medium of transmission , Grabowski (1979) found that preservice elementary teacher's attitude toward science was changed as a result of listening to the persuasive message . Koballa (1981) , in a study parallel to Grabowski's , but testing the attitudes about energy conservation instead of science attitudes toward science , found significant gains in the positive attitude mean scores , not only from pre - to posttesting , but from pretesting to retention testing , suggesting a significant persistence of attitude change three weeks following the treatment. Focused on another attitude object , attitude toward teaching simple chemical changes, Hassan (1982) found

that a written persuasive communication caused a postive change in the attitudes of preservice elementary teachers . The aforementioned studies that tested Hovland's model in the area of science education have expressed the need for further research to test this model . That is the intent of this study .

The Purpose

The purpose of this study was to determine the effect of written persuasive communication on changing attitudes of Egyptian preservice biology teachers toward teaching the topic of organic evolution as measured by the Attitude Toward Teaching Evolution Scale (ATTTES) .

Procedures

Experimental Desigh

The Pretest - Posttest Control Group Design as described by Campbell and Stanley (1963) was chosen as the design for this study. This design is presented in Figure 1 .

Pretest	Treatment	Posttest
O_1	X_1	O_2
O_1	X_2	O_2

O_1 - pretest (The Attitude Toward Teaching Evolution Scale(ATTTES) .

O_2 - posttest (The Attitude Toward Teaching Evolution Scale(ATTTES) .

X_1 - Written persuasive communication treatment.

X_2 - Control communication treatment .

Figure1. Experimental design used in the study .

Subjects

The subjects who participated in this study consisted of 154 volunteers (46 males and 108 females) enrolled at Biology Section in the College of Education, University of Tanta, Egypt during the acadmic year 1983-1984 . All subjects were seniors. They were expected to work as science teachers starting with the acadmic year 1984 - 1985 . The age of the subjects ranged from

21.5 to 24.6 years with an average of 22.1 years, (SD = 1.2) .

The subjects were randomly divided in two equal treatment groups (77 Ss each) ; the experimental group (the persuasive communication group , and the control group (the control communication group) .

Treatment Materials (1)

Two different treatment materials were used as a part of this investigation :

1- The persuasive communication treatment .

The persuasive communication treatment was a written two sided communication . It consisted mainly of two opposite groups of arguments (Table I) The first , the opposing arguments represent the view of individuals who oppose teaching the topic of organic evolution . The second , the supporting arguments represent the view of supporters of teaching

(1) Copies of the treatment materials are avaiable at the authors upon request .

this topic in schools.

The first group of arguments was collected from two sources : 1) Arabic literature dealing with the topic of organic evolution and , (2) an open questionnaire in which preservice biology teachers were asked to write some statements that explain their objections on teaching that topic .

The second group of arguments was gathered by a questionnaire. Five Egyptian science educators were asked to write some statements they had used as they persuaded preservice biology teachers to teach the topic of organic evolution . The procedure of gathering this group of arguments was paralleled the systematic and empirically validated procedure done by Koballa(1981) and Hassan (1982) .

Based on review of literature (Zimbardo , Ebbesen and Maslach , 1977 ; Hassan 1982) , the following guidelines were considered when writing the persuasive communication :

a) The opposing arguments were presented first in the communication . The supporting arguments followed immediately the opposing arguments .

b) A definition of the concept of organic evolution in addition to a correction of related misconeptions were included in the communication .

c) No attempt was made to present an emotional appeal or arouse fears .

d) Cues which might forewarn the subjects that the intent of the communication was to change attitudes were consciously avoided .

e) Conclusions were drawn at the end of the communication .

Subjects of the experimental group completed reading the persuasive communication in about 15 Minutes. To be sure that the subjects read the communication , a recognition test covering the main ideas in the communication was givin to them . The subjects who scored below the 85 percentile were eliminated from the study. All subjects met this criterion .

TABLE I

Summary of the Two Sided Arguments Presented

in the Persuasive Communication

Opposing Arguments	Supporting Arguments
1. God created all living organisms as they now existed .	1. The Holy Qur'an doesn't reject the idea of organic evolution; on the contrary there are some verses that can be understood to imply this idea .
2. The Holy Qur'an seems to support the idea of special creation .	2. The Holy Qur'an persuades man to make research on how creation began.
3. The study of organic evolution may shake students' faith.	3. Most clergymen do not oppose teaching the topic of organic evolution in schools .
	4. The assumption that evolutionists are atheists is clearly incorrect .
	5. The topic of organic evolution is considered one of the basic subjects of biology which a student ought to know .

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2- The control communication treatment.

The control communciation treatment was a written communication about " air pollution" . This topic was chosen because it is not related to teaching of the topic of organic evolution .

Subjects of the control group read the control communication in about 15 minutes , which was equal to the time needed to read the persuasive communication.

To be sure that the subjects read the control communication , a recognition test covering the main ideas in the communication was given to them .

Measurement Instrument

An instrument entitled " The Attitude Toward Teaching Evolution Scale "(1) was developed by the two investigators of this study. The procedure of designing this instrument paralled that done by Shrigley and Trueblood (1979) and Hassan (1982) .

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(1) Copies of " The Attitude Toward Teaching Evolution Scale are avaiable at the authors upon request .

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This instrument is a 22 - item , Likert- type attitude scale, 11 positive and 11 negative statements, surveying the feeling of teachers toward teaching the topic of organic evolution . Examples of these items are :

1) Teaching Evolution Theories does not oppose religion.
2) I will avoid answering any question raised by my students concering the organic evolution of living organisms .
3) I prefer that the Ministry of Eduaction prevents teaching the topic of organic evolution in our schools.

A subject's attitude toward teaching the topic of organic evolution was measured by having him rate each item on a five- point scale of response (" strongly agree", "agree" " undecided" , " disagree" and " strongly disagree") . In scoring the positive statements, the atternatives were Weighted 5,4, 3, 2,1. In scoring negative statments, the weight were reversed . The maximum total score a subjest can obtain on this instrument is one hundred and ten.

The coefficient alpha for this instrument was found to be 0. 93 .

Analysis of the Date

In this study , the following null hypothesis was formulated :

There is no significant difference ($P < 0.05$) in the adjusted posttest mean attitude scores (1) as measured by The Attitude Toward Teaching Evolution Scale between the experimental group (the persuasive communication group). and the control group (the control communication group).

The one - way analysis of covariance was used to test the significant differences in the adjusted posttest mean attitude scores between the experimental group and the control group .

The assumptions underlying the analysis of covariance were tested (Elashoff , 1969). All the assumption had been met .

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(1) The adjusted posttest mean is the average of the posttest scores after they are adjusted for the effect of the pretest scores, the concomitant variable (i.e. , the covariate) .

Results and conclusions

The one way analysis of covariance(Table II) revealed that there was a significant difference ($F = 3.91$; df = 1, 151 ; $P < .05$) in the adjusted posttest mean attitude scores between the experimental group (the persuasive communication group) and the control group (the control communication group). Therefore the null hypothesis is rejected . This difference was in favor of the experimental group . The adjusted posttest mean attitude score of the experimental group was higher than that of the control group (see Table III) .

TABLE II

Analysis of Covariance for the Difference in the Adjusted Posttest Mean Attitude Scores Between the Experimental and Control Groups

Source of Variation	df	SS	MS	F
Between groups	1	1918.52	1918.52	33.43 *
Within groups	151	8666.18	57.39	

* $P < .05$.

TABLE III

Prettest, Posttest, and Adjusted Mean Attitude Scores for the Experimental and Control Groups

Group	N	Pretest $\bar{X}$	Pretest SD	Posttest $\bar{X}$	Posttest SD	Adjusted Mean
Experimertal	77	76.01	15.39	82.22	14.80	84.26
Control	77	81.12	15.14	79.32	14.83	77.27

Based on the results of this study, two conclusions were drawn :

1- The Egyptian preservice biology teachers who received the written persuasive communication treatment had a positive change in their attitude toward teaching the topic of organic evolution .

2- Asystematically designed persuasive communication using Hovland's model (Hovland et al., 1953) can yield a positive change in attitudes toward teaching the topic of organic evolution .

Discussion

The present study revealed a significant difference in the adjusted posttest mean attitude scores between the persuasive

communication group and the control communication group . This difference was in favor of the persuasive communication grou In general , the finding of this study are in agreement with the findings of Grabowski (1979) , Koballa (1981) and Hassan (1982) .

One possible explanation of finiings of this study is that the arguments presented to support teaching the topic of organic evolution could have corrected some of the subjects misbeliefs about this topic . Centeral to these misbeliefes is that the Islamic Religion opposes teaching the topic of organic evolution . This misbelief may contribute much to the negative attitude that some teachers have toward this topic .

Asecond possible explanation for these findings may be advanced in terms of the effect of message comprehensibility . According to Hovland and his associates, for a message to be persuasive , it must be attended to and comprehended (Hovland & Janis, 1959) . In the present investigation attention was secured by using a printed message and administering a recognition test covering the main ideas in the communication.

Implications of the Study

Based upon the results of this study, major implications can be stated as follows :

1- The Attitude toward teaching the topic of organic evolution can be changed. This , in fact , could be a major step in encouraging preservice biology teachers to teach the topic of organic evolution to their students .

2- Contrary to the common belief that attitude change can be brought only by a lengthy treatment , a persuasive communication can in short session (15 minutes), change the attitude of the subjects . This is of special importance with regard to the limited time and finance available for many in- service programs and workshops for teachers .

3- Consistent with previous studies in the field of seience education (Grabowski , 1979, Koballa, 1981 ; Hassan , 1982) support is indication for designing a persuasive communication using the systematic strategy of thoroughly investigation each component of Hovland's theoretical framwork .

Recommendation for Further Research

The following recommendations for future research are suggested :

1- The present study was conducted on a sample drawn from Egyptian preservice biology teacher population. It would be desirable to replicate this study in other nations .

2- One of the shortcomings of the present study was that it tested only the immediate effect of the persuasive communication on attitude change . This immediate effect could vulnerable to dissipation after few days. Therefore , further research is needed to test the retention effect of this communication .

3- No attempt has been made in this study to test the effect of any of the individual differences variables on attitude change. Further research is needed to test the effect of some related individual differences variables such as subject misbeliefs and prior knowledage about the organic evolution, dogmatism, field dependent field indpendent cognitive style , religious references, sex and previous experiance with teaching the topic of organic evolution .

4 - Looking to the field of social psychology , science education research might be able to conduct studies that apply other approaches of attitude change . Lewin's group dynamics approach , as described by Zimbardo et al., (1977) might be a viable approach in this respect . Further research is needed to compare this group dynamics approach with Hovland's approach with regard to changing attitudes of teachers toward teaching the topic of organic evolution .

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